

REMARKS

Claims 1-11 are pending in the present application. Claims 1-11 have been cancelled and new claims 12-18 have been added to more clearly define what the Applicants are claiming to be their invention. New claim 12 is an amended version of cancelled claim 1 with the limitations of cancelled claims 2-3 added.

In response to the Notice of Non-Compliant Amendment mailed on March 18, 2008, the Applicants have cancelled claims 1-11 and have not shown the text of the cancelled claims. With regard to the Office Action mailed on October 31, 2007, the Applicants have carefully considered the specific issues raised by the Examiner and respond as follows:

Rejection Under 35 U.S.C. 102

Claim 1 has been rejected under 35 U.S.C. § 102(e) as being unpatentable over U.S. Patent No. 6,831,895 to Ji et al. (“Ji”), which discloses a method for relieving congestion in hop-by-hop packet networks by diverting traffic from congested links. Claim 1 has been cancelled and rewritten as new claim 12 to include the limitations of cancelled claims 2 and 3. The Examiner has already found that cancelled claims 2 and 3 are not anticipated by Ji. At page 4, lines 12-13 of the Office Action, the Examiner states that Ji does not teach the fractional allocation strategy of cancelled claim 2. Accordingly, new independent claim 12 and new dependent claims 13-18 are not anticipated by Ji. Moreover, for the reasons set forth below, new claim 12 and new dependent claims 13-18 are not obvious over in view of the combination of Ji and Lee.

Rejection Under 35 U.S.C. 103

Claims 2-5 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Ji in view of U.S. Patent No. 6,963,927 to Lee et al. (“Lee”), which discloses a method for determining a circuit path between two nodes by iteratively selecting appropriate next nodes using a shortest path algorithm and determining if the overload traffic can be transferred to the selected path without exceeding the selected path’s threshold level. Abstract. New claim 12 includes the limitations of cancelled claims 1-3.

The method in new claim 12 balances the traffic across a network by first identifying a selected path in the network that has an initial overload. In step (c) of new claim 12, the “portion ($y(t)$) of the initial selected path overload ($x_0(0)$) to be off-loaded and distributed to the other paths (p_i)” is calculated. Then in step (g), “the portion of the traffic ($y(t)$) is distributed to the other paths (p_i) using the equation $x_i = l_i(t) + \frac{h_i(t) - l_i(t)}{\sum_{i=1}^P (h_i(t) - l_i(t))} (y(t))$. An “updated selected path load ($x_0(t)$)” is calculated in step (d) and distributed in step (g). Steps (d) to (h) for distributing the load are repeated for a predetermined number of iterations. In this manner, the overload on the selected path is distributed to a plurality of other paths in the network.

The method disclosed by Lee does not distribute a path overload to a plurality of paths as required by the claims of the present application. Lee teaches that, when a new circuit is provisioned between a start node and an end node, a “shortest path algorithm” is used to identify the shortest path between the start node and the end node. The expected load (i.e., the existing load plus the load of the new circuit) on each of the links of the identified shortest path is then

measured to determine if the addition of the new circuit will exceed the threshold load level for the links on the shortest path. If the threshold is exceeded, the “shortest path algorithm” is then used to identify the next “shortest path” and the expected load for this path is checked. This procedure is repeated until a path is found where the addition of the load of the new circuit will not exceed the threshold level. See col. 5, lines 14-59.

Lee uses iterations of the “shortest path algorithm” to identify the shortest paths between the start node and the end node until a path is identified which has a threshold that will not be exceeded when the new circuit is added. The load from the new circuit is then assigned to the identified “shortest path” and, when the circuit is activated, the entire load for the circuit is immediately sent to this “shortest path.” There is no gradual transfer of the load over a plurality of iterative steps and there is no distribution of the load over a plurality of paths.

In contrast to the iterations of the algorithm for finding the “shortest path” taught by Lee, the iterations in the claims of the present invention refer to the incremental distribution of a portion of the overload on the selected path to a plurality of other paths. A bi-sectional search strategy is used to calculate the portion of the overload that is distributed in each iteration using

the equation $x_i = l_i(t) + \frac{h_i(t) - l_i(t)}{\sum_{i=1}^P (h_i(t) - l_i(t))} (y(t))$. This allows the overload from the selected path to

be gradually distributed to other paths in the network in increments so that the total loads on the other paths increase gradually. The claims do not require identification of the shortest path and do not assign the entire load to a single path as taught by Lee. In the method taught by Lee, once a shortest path with sufficient available capacity to accept the new circuit is identified, the entire load for the new circuit is assigned to the path.

In rejecting claims 4 and 5, the Examiner states that, “The shortest path algorithm using threshold level comparison bandwidth utilization level produce equivalent results as the equation in claim 3.” O.A., page 3, lines 2-3 and 20-21. This is a mischaracterization of the teachings of Lee. Lee uses the shortest path algorithm to determine the shortest route between two nodes in a network. The equation in cancelled claim 3, which is now in new claim 12, is used to distribute the overload from a selected path to a plurality of other paths based on load levels in the other paths. The shortest path algorithm in Lee is entirely different from the Applicant’s equation for distributing the overload. Lee discloses that, when a new circuit in a network is provisioned, a “shortest path algorithm [is used] to find the optimum route” between two nodes in the network. Col. 1, line 47. Once a shortest path is found, Lee teaches at col. 5, lines 18-23 that:

if the bandwidth utilization level or “load” on any of the links [on the shortest path] connecting nodes A through G has reached or exceeded a preset threshold level, such as 50% bandwidth utilization level, then another shortest or “next shortest” path is found where the load is found, such that the threshold level is honored.

Thus, Lee uses the shortest path algorithm to identify the shortest path and then checks to see if the added load from the new circuit will exceed the threshold level of any of the links in the shortest path. If the threshold level is exceeded, Lee uses the shortest path algorithm to identify the “next shortest” path and the threshold level of this path is checked. Lee “iteratively” continues to identify the “next shortest” path until a path is identified that can accept the new circuit without exceeding the threshold level. This method is clearly set forth in claim 1 of Lee:

A method, comprising iteratively defining a circuit path between a source node and a destination node in a network comprising a plurality of nodes interconnected by links, where each link has associated with it a respective bandwidth utilization level, and where links having bandwidth utilization levels exceeding a threshold

level are not used to define said circuit path; determining an ideal shortest path between the source node and destination node; comparing the ideal shortest path to the iteratively defined circuit path; and in the case of the iteratively defined circuit path exceeding said ideal shortest path by a threshold amount, adjusting said threshold level and repeating said step of iteratively defining said circuit path.

One of ordinary skill in the art would not find that the shortest path algorithm disclosed by Lee taught or suggested the equation in new claim 12 for distributing overload to a plurality of paths based on the loads if each of the plurality of circuits.

In rejecting claim 5, the Examiner states at page 7, lines 17-18 of the Office Action that, “The algorithm [in Lee] calculates portion of traffic on selected path by using shortest path threshold level comparison to select a link.” This statement misconstrues the teachings of Lee with respect to the present invention. Lee teaches that the algorithm is used to select the shortest path or “optimum route” between two nodes (col. 1, line 47). The loading of each of the links in the path is checked and links that would be overloaded if a new circuit were added are not used. Col. 6, lines 47-53. The shortest path algorithm continues to accept and reject links

After the shortest path algorithm is used to identify the shortest path, the loads for each of the links are checked to determine if the addition of a new circuit will cause the threshold level to be exceeded. Col. 5, lines 14-23. The shortest path algorithm is not used to “calculate portion of traffic on selected path” or to check load levels. Moreover, the shortest path algorithm is not used to “select a link,” it is used to select a “shortest path” or “next shortest path” made up of a plurality of links.

Moreover, in rejecting claim 5, the Examiner found at page 5, line 19 to page 6, line 2 that, “it would have been obvious to one of ordinary skill in the art at the time of the invention to combine wherein the bi-sectional search strategy uses a multidimensional iterative bisection search algorithm as taught by Lee with the method of the combination of Ji and Lee in order to be able to determine the appropriate link with respect to bandwidth utilization level.” (Emphasis added.) The Examiner has found that the combination of Lee and Ji teaches a method that “determine[s] the appropriate link.” In contrast to the combination of Lee and Ji, the method in new claim 12 does not “determine the appropriate link,” but instead new claim 12 uses a “bi-sectional search strategy” to determine the amount of traffic from the selected path overload that is to be transferred to the other paths in the network.

One of ordinary skill in the art would understand that using a bi-sectional search strategy to select a link that can accept additional traffic without overloading as taught by Lee is not the same as using a bi-sectional search strategy to determine the amount of overload on a selected path that will be distributed to other paths. Accordingly, the Applicants respectfully request that the Examiner withdraw the rejections based on a combination of Lee and Ji and allow new claims 12-18.

Claims 6, 7, 9 and 11 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Ji in view of U.S. Publication No. 2004/0193728 to Doshi et al. (“Doshi”), which discloses a method for reserving a minimum amount of protection bandwidth on each link in a network to enable service to be restored upon failure of another node or link in the network. With regard to the rejection of claim 6, this claim has been cancelled by this Amendment and none of the new

claims measure the cost for using a path. With regard to claims 7, 9 and 11, these claims have been cancelled but several new claims are similar and relate to different methods of measuring network traffic. However, the new claims depend on new claim 12 and Doshi does not overcome the deficiencies in Ji that are discussed above.

Claims 8 and 10 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Ji in view of U.S. Patent No. 6,865,510 to Engbrecht (“Engbrecht”), which discloses a method for analyzing network traffic between two systems to determine the most efficient data transfer paths. Claims 8 and 10 have been cancelled. However, the new claims depend on new claim 12 and Engbrecht does not overcome the deficiencies in Ji that are discussed above.

Conclusion

The Applicants submit that the new claims added by this Amendment and the arguments made herein have distinguished the cited references from the present invention and respectfully request early allowance of the claims. If the Examiner has any questions or comments relating to this Amendment, the Examiner is respectfully invited to contact Applicants' attorney at the telephone number provided below.

Respectfully submitted,



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